movement of large masses of snow, I have seen trees six feet high torn up by the drifts. Large drifts are generally formed near the summits of steep banks about timber line and easily prevent trees obtaining a foot hold upon the steeper slopes. If such a slope at its summit has a comparatively level area protected by a higher summit some distance beyond, there will be a sort of double timber line, one at the foot of the bank and one some distance beyond its summit, but the upper one is formed by trees, almost prostrate, bent and twisted downward and distorted into all manner of shapes by the weight of the snow. They owe their existence to the nearly level habitat which prevents them from being torn up by a downward motion of the snow. Without a higher protecting ridge this second timber line would be impossible on account of the winds which would keep the summit clear of trees.

The prevailing winds are from the west from which direction the snow is drifting almost continuously throughout the winter. On almost any clear winter day the banners and streamers of snow can be seen coming from the summits. In consequence of the prevalence of western winds, the largest drifts are on the eastern slope and on the eastern slopes of north and south spurs and timber line is higher on western slopes. This is plainly seen upon the smaller spurs having a north and south direction. If the soil and slope are the same upon both sides, the tree line will round the spur from the western exposure and fall on reaching the eastern slope five or more hundred feet. The wind storms are most violent on the high ridges and divides and prevents the growth of trees in such places, but their direct destructive influence reaches only two or three hundred feet each side of the summit and a lower limit to the forest is due to the drifting snow. Sometimes but rarely a line of prostrate trees between wind and snow can be found, just over the summit out of reach of the wind and not far enough down the slope to enable the drift to obtain a hold and uproot them. *Picea Engelmanni* does not record in its growth the direction of the wind as *Pinus aristata* sometimes does in exposed situations when the twisted and turned branches plainly show that the prevailing winds are from the west. The limit of trees being determined by the winds and the snows drifting about the summits, then timber line depends very much upon the height of the dividing ridge and the higher the mountain the higher the tree line, other conditions being the same.

Timber line reaches its highest altitude where there is a large area of high elevation extending long distances from dividing ridges. —T. S. Brandegee.

Notes on some Californian Plants.—A residence of a year and a half in the Southern part of California, principally in the neighborhood of Los Angeles, has enabled me to study and collect the plants of that region, and I propose giving the readers of the Gazette some account of a few of the most interesting features of the vegetation of that locality. I shall select for my purpose only the more

remarkable and interesting forms of vegetable life, and those which are not known to the east of the mountains.

Eschscholtzia Californica, Cham., the Californian Poppy, is one of the commonest plants in some localities. Where it grows in large patches, as it very frequently does, the blossoms make the ground appear of a most intense golden color, and when the sun is shining brightly upon them, the eye is dazzled by the blaze It is a very variable species, and its synonomy as given in "Watson's Index" is very large. It does not seem to occur at all east of the Wasatch mountains, but is very common in California, especially in the neighborhood of Los Angeles.

Platystemon Californicum, Benth. A species peculiar to California, and commonly known as Cream Cups, from the color and shape of the flowers. These are quite large, at the top of naked hairy peduncles. The leaves are all linear and mostly radical. It is very common near Los Angeles.

Thysanocarpus curvipes, Hook. Remarkable for the curious pods which terminate the slender, drooping pedicels. The flowers are small, white and inconspicuous. One of the forms has the wing of the orbicular pod perforated, and it is, therefore, known as the Lace pod. It grows on rocky banks and in dry soil

Isomeris arborea, Nutt. This is another strictly western plant. It is a tall half woody shrub, with three parted leaves, clusters of yellow flowers, and inflated bladdery pods. It belongs to the *Capparidaceæ* and is quite common near San Diego, and on the Colorado desert.

Sidalcea malvaeflora, Gray. Found as far east as Colorado. It grows tall and slender; long petioled, crenate, heart shaped leaves, and flowers large, bright purple, and arranged in a loose raceme.

Erodium moschatum, L'Her., and *E. cicutarium*, L'Her. The former of these two species is the more common, and is of a larger and more vigorous growth than the latter. The seeds are the most remarkable feature of the plant, and these I have described in the GAZETTE for September, 1879. The common name of Pin Clover is given from the seeds.

Schinus Molle, Linn. The Pepper Tree. This is one of the shade trees of Southern California, and is one of the prettiest of trees. The flowers are small, greenish white in long racemes. The fruit is globular, of a deep red color, and hangs in long bunches, contrasting beautifully with the pinnate leaves. It is hot and peppery to the taste, and in Mexico, where the tree is native, it is known as Chili pepper. From the broken leaves and branches exudes a white gummy substance, which is also peppery. Generally not very tall, it branches some eight or ten feet from the ground. The bark is rough and scaly, but the long pendulous branches and pinnate leaves are handsome. Blossoms twice a year, and is an evergreen, the branches never being bare of leaves. It is extensively planted in Southern California, but the climate of San Francisco is not very suitable for its full development.

Rhus diversiloba, Torr. and Gr. is the Poison Ivy or Oak of Cali-

fornia, and is very similar in appearance to the Rhus Toxicodendron, L., and seems to be even more poisonous. It is either an erect or climbing shrub, with three parted crenate leaves, and small clusters of greenish flowers. A preparation of *Grindelia robusta*, seems to be efficacious in curing the poison. Another species, *R. aromatica*, Ait. is sometimes mistaken for *R. diversiloba*, and is said to effect some people in the same way.

Lupinus rivularis, Dougl. This is one of the handsomest of all the Lupines. Tall and stout in habit, it has large, long petioled leaves, smooth and bright green. A dense spike or raceme of bright blue flowers is at the summit, and it adorns in profusion the zanjas or ditches near Los Angeles.

Medicago sativa, L. The Alfalfa or Lucerne of the farmers This has been introduced from Australia, and forms one of the most valuable pasture plants of California. It grows very rapidly and is often cut four and six times in a season. Once planted and well rooted a field is said to last for 30 years. The roots penetrate so deeply into the soil that they find sufficient moisture for their nourishment without irrigation *M. denticulata*, Willd., is the Bur or Sheep Clover. It has small yellow flowers, but its chief value is in the burs which afford good nourishment for sheep when all other feed has disappeared from the ground.

Adenostoma fasciculatum, Hook and Arn. This is the celebrated greasewood we are told so much about and which forms nine-tenths of the vegetation in many parts of the mountains. It is a bushy shrub with awl shaped leaves, and close clusters of white flowers. The roots are extensively used for fuel, and its presence on land is a sure indication of water at no great depth.

Heteromeles arbutifolia, Roem. A very pretty small tree, with crenate coriaceous, bright green leaves, and clusters of white flowers. In the fall the red berries hang on the tree in great profusion, forming large bunches and looking in the distance like apples.

Saxifraga Parryi, Gray, is strictly a Californian species, and is a very pretty one. It springs from a bulb, and the short stalk has hairy radical leaves, and is surmounted by a small cluster of white flowers. It grows in profusion in dry rocky sod near San Diego.

Jussiæa repens, var. *Californica*, Wats. I mention this plant to say that I found it growing in San Juan Canon in the water from some hot sulphur springs. The plants were growing in water which was uncomfortably hot to the hand. Again I have seen them growing in the mud on the Los Angeles River.

Godetia Bottae, Spach. This is a fine species of the genus and has very large, handsome purple flowers. It is peculiarly a western form and is very common in good soil near Los Angeles.

Megarrhiza Californica, Torr., is a close relative of *Echinocystis lobata*, Torr, and Gray, and has much the same habit of growth. It climbs over brushes and shrubs and its long racemes of white flowers, or the large spring fruit look very pretty in the bushes. The

fruit always opens at the top, and as this hangs down, the seeds drop out as soon as ripe. The tendrils are long and sensitive.

The *Umbelliferae* and *Compositae* are very well represented in California, but not having yet determined many of them I leave them for another time.

Arctostaphylos glauca, Lindl., is the Manzanita of the mountains. Generally speaking it is a small tree or shrub, with very crooked branches. The wood is very hard and tough, and of a deep red color. The flowers are of a rose white, and in open racemes with very sticky pedicels, and the leaves are thick and coriaceous It grows plentifully in some places in the mountains.

Styrax Californica, Torr. This is a small tree with rough crooked limbs, white bell shaped pendulous flowers, and tomentose leaves. It belongs to a genus which has but few representatives in the United States, and which is by no means common. Its favorite locality is on the sides of the mountains, in the damp canons; and even here it is not plentiful

Gilia Californica, Benth This is one of the commonest species of this extensive genus. It forms a small bush growing on the mountain side. The leaves are awl shaped, and sharp pointed, while the flowers are quite large, funnel shaped, and of a lilac or purple color. It is one of the best marked, and most peculiar of all the species of *Gilia*.

Gilia intertexta, Steud., has small white flowers, and grows spread out like a mat on the ground, the leaves being bipinnate.

Gilia multicaulis, Benth., with the var. *tenera*, Gray, is very common in California. The stem is simple and low, with a few finely dissected leaves at the base, and a bunch of violet flowers at the top of the stalk. The variety generally has but a single bloom, and comes out very early in the season.

Heliotropium Curassavicum, L. This is a handsome bright green plant, with scorpioid terminal racemes of white flowers, the whole plant invariably turning black when dry. It is very common in damp or moist soil.

Phacelia ramossissima, Dougl., *P. tanacetifolia*, Benth. and *P. hispida*, are all closely related and often hard to distinguish from each other. The last can be known by its globular capsules and long calyx teeth. The flowers of all of them are blue or bluish, arranged in recurved one sided racemes, while the leaves are all dissected.

Eriodictyon tomentosum, Benth. A tall shrub with thick crenate very tomentose leaves. Flowers blue, in a loose spike. Another species of this genus, *E. glutinosum*, Benth., is called by the Mexicans "Mountain Balm" or "Yerba Santa," and is very much prized by them as a medicine. *E. tomentosum* is said to be an excellent remedy for bronchial troubles, and also for asthma. I have been told by several persons that it benefitted them greatly. The leaves are made into a sort of weak tea and the patient drinks it when he feels like it.

Nemophila insignis, Dougl. One of the prettiest of the wild flowers. It is a small low plant, with a bunch of bright blue or purple

flowers at the top of the stem, and with pinnatifid leaves at the base.

Nicotiana glauca. A small tree growing very plentifully in Los Angeles. The leaves are large, very smooth and glaucous Branches of a light green, with small clusters of yellow, tubular flowers. It seems to blossom all the year round, and its favorite place of growth is on the banks of zanjas in cultivated or waste ground. Perhaps introduced. Not given in the Flora of California.

Datura meteloides, DC. A splendid species of the genus. The flowers are often eight inches in length and four or five in diameter. The corolla is of a creamy white, with quite an agreeable odor. The plant forms a small bush three or four feet high, and though regarded as a common weed, it is well worth the attention of gardeners.

Abromia maritima. A very handsome plant, growing in mats close to the ground. It is clammy pubescent all over, and the flowers are in close umbels, and of a bright purple. What makes it seem prettier than it otherwise would, is perhaps, the fact that it grows in barren sandy places, and the flowers contrast beautifully with the dry sand.

Platanus racemosa, Nutt., is the representative of the sycamore of the east. It has much the same habit of growth, and general appearance, but the leaves are three to five cleft instead of being toothed. The wood is so hard that it will often turn the edge of an ax or hatchet. It grows to be one of the largest trees of Southern California, and one in the yard of a brewery in Los Angeles must be between 30 and 50 feet in circumference. A specimen of *P. occidentalis* is mentioned in the GAZETTE for June which is 48 feet in circumference.

Quercus agrifolia, Nee, the Live Oak of California is the relative of *Q. virens*, the Live Oak of Florida. It is found in the canons of the mountains in the south and also all over the San Joaquin valley. The leaves are evergreen, coriaceous, and with sharp pointed serrations. It branches quite low down and in open ground like the San Joaquin valley, its top is rounded and symmetrical, forming a crown fit to grace the lawn of a nobleman. It grows very large. for I measured one which was 21 feet in diameter, 3 feet from the ground.

Anemopsis Californica, Nutt. A marsh plant, with ovate leaves, and flowers in a dense spike, with an involucre of white leaves. The Mexicans make a salve of the bruised leaves and use it to bring down the swelling of bruises and sprains.

Yucca Whipplei, Torr., is very handsome. The flower stem is often ten feet high and is covered for about one half its height with a dense mass of bell shaped white flowers. The leaves are long, serrulate, and with hard sharp points. When they get old they become frayed at the edges, hanging in long filaments on each side.

Calochortus splendens, Dougl., is well named. The flowers are large, open cup shaped, situated on long peduncles, and of a bright blue, the petals fringed on the inner side with numbers of yellow hairs. At a distance it is a very striking plant.

Polypodium Californicum, Kaulf., is similar to *P. vulgare*, L., but

of larger growth. Common in canons where there is plenty of shade and moisture.

Gymnogramme triangularis, Kaulf. Commonly known as "Gold backs," from the golden color of the spores. Grows in crevices of rocks and is a great favorite in cultivation.

Notholaena Newberryi, Gray. Sometimes called "Silver Fern," as it is very white and tomentose underneath. It grows from four to six inches high on the mountain side.

Adiantum emarginatum, Hook. Larger than *A. Capillus-Veneris*, L., and with the segments of the fronds not incised. Common in canons in damp places.

Woodwardia radicans, Smith. A very imposing fern growing from four to six feet high in large clumps. Common along streams in shady canons. — Jos. F. James, *Cincinnati*.

"Systematic Fern-List."—A classified list of the known ferns of the United States of America, by Daniel C. Eaton, New Haven, Conn. September 7, 1880. First edition.

This neat and timely "Fern-List," by the author of the "Ferns of North America," is most welcome, and will be warmly received by all fern students. The species and genera are arranged in tribes and the geographical range noted. All the recent additions, including *Notholæna nivea* (for which New Mexico should be added to the range) and *N. Lemmoni*, discovered since the completion of the two volumes of Ferns of North America, are given.

The List is designed for exchanges, and will not only serve its purpose admirably, but help to familiarize students with the changes in nomenclature adopted by the author in his fern book, although the necessity for some of them is certainly to be regretted.

It was so much easier, for example, to write *Ophioglossum bulbosum* than *O. crotalophoroides!* and then Michaux's name had become so well established, and was, withal, so exceedingly appropriate that it seemed a pity to disturb it. But the law of priority is inexorable, and we must write Walter's name whether we like it or not. It may not be out of place here to state that the recent collection of two very distinct forms of *Asplenium myriophyllum*, by Miss Reynolds, makes it almost certain that we shall have to recognize the presence of *Asplenium rhizophyllum*, Kunze in Florida, and reduce *myriophyllum* to the rank of a variety of that species with Hooker. I have the authority of Mr. Baker for saying that Miss Reynolds' two forms represent those two ferns as they have them in the Kew Herbarium, thus rendering this further change in our nomenclature probable.

Hooker here, as in the larger work referred to, is given as authority for *Aspidium spinulosum* var *dilatatum*, but it appears from some notes published in the Canadian Naturalist, by D. A. P. Watt, of Montreal, that *Aspidium dilatatum* was first reduced to a var. of *spinulosum* under *Polystichum* in "Hand-book i Skandinaviens Flora," p. 398, by Hartmann, and the name *Aspidium spinulosum* var. *dilata-*